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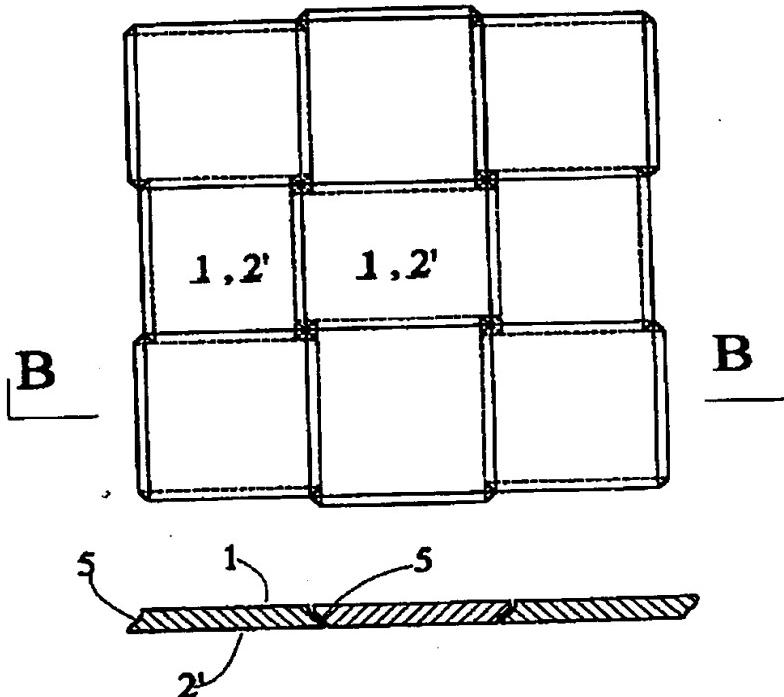


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(71)(72) Applicant and Inventor: MOLNÁR, János [HU/HU]; Dobrei János ut 28, H-5430 Tiszaföldvár (HU).			
(74) Agent: FABER, Miklós; Advopatent, Fő u. 19, H-1011 Budapest (HU).			

(54) Title: SET OF ELEMENTS FOR FLAGGING SURFACES

(57) Abstract

A set of elements for flagging surfaces, e.g. pavements, slopes, walls or for walling, each element of said set has a flat top face and a flat bottom face parallel to each other, said top face and said bottom face are rectangular or polygonal with even-numbered sides, along the peripheries of said top face and said bottom face there are alternately bearing abutting side faces and covering abutting side faces conform to each other characterized by virtual inclined planes (8) defined by the sides of said top face (1, 2, 3, 4) and the corresponding sides of said bottom face (1', 2', 3', 4'), and each of said abutting side faces (5, 6, 7, 5', 6', 7') comprising at least one extended face section (9) and one adjoining recessed face section (9') relating to said virtual inclined planes (8).



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SET OF ELEMENTS FOR FLAGGING SURFACES

The subject of the invention is a set of elements for flagging surfaces, e.g. pavements, slopes, walls or for walling, each element of said set has a flat top face and a flat bottom face parallel to each other, said top face and said bottom face are rectangular or polygonal with even-numbered sides, along the peripheries of said top face and said bottom face there are alternately bearing abutting side faces and covering abutting side faces conform to each other.

Most of the known building and flagging elements need binding material to be fixed to each other and to the surface to be flagged. Another group of the building elements comprises different tongues and/or grooves at least on the two opposite sides. The tongues and/or grooves fitting into each other serve as a joint for the element, the subsequent clipping of joints usually cannot be eliminated even in this case.

A good example for the first group is the ordinary paving stone, which is laid into mortar, then the vertical joints are filled.

Patent specification HU 210 413 reveals a building element, the opposite side faces of which are provided with complementary engaging teeth. The joints need clipping, but the elements can be turned and displaced relating to each other to a small extent.

According to the proposal of patent specification HU 200 375 the slab-shaped flagging elements are connected by a hinged joint at least along one side. On the narrow side face there is a curved groove with the equally curved tongue of the adjoining element in it. The hinged joint enables the elements to turn a bit and follow the possible small soil motions this way. However, when the elements detach from each other to a small extent, the mortar filling goes wrong, the elements can get displaced from the flagging plane and can slip on each other.

Patent specification HU 194 334 refers to a flagged surface with elements having turnable tongue-and-groove or hollow joint portions receiving the tongue. The joint between the elements is fixing them so that they can be removed from the continuous surface only by crushing it. Disadvantageous, that the surface is not jointless. The joints are geometrically complicated, and can be realised only of elastic materials, while rigid materials as stone, concrete and artificial stone are not suitable for this purpose. The joint portions are located on a section of the side face only instead of its whole length, therefore the bearing capacity of the elements are decreased.

Prefabricated flagging elements for constructing tennis courts are revealed in patent specification FR 2 543 591. The elements made of burnt clay mixed with expanded clay, light cellular concrete, asphalt or glass agglomerate are laid on sand or mortar bed. Two opposite side faces of the element are provided with two extensions or an extension and a matching recess having the shape of a rectangle or triangle or trapezoid. While the resulting surface might be suitable for certain limited loads, it is not able to cope with heavier traffic since there is no load-bearing connection in one of the main directions.

A construction block particularly for paving is introduced in patent specification EP 0 102 214. The block has parallel top and bottom faces. At least one of them is a rectangle, while the other can be a square as well. The four side faces are trapezoids, two opposite ones sloping inwardly and the rest sloping outwardly. In the pavement the elements are interlocked by each other, each serving as support to the adjacent ones. Due to the mutual support none of the elements can be removed without disturbing the others.

A drawback to the block is that it is hard to make a planar surface because of the inevitable limit of the accuracy of manufacture. It is hard to eliminate the inaccuracies of the bedding, too. Employing identical rectangles for the top and bottom faces results a hollow at the joint of every four blocks. The size of the hollow depends on the angle of slope of the side faces.

A member for constructing a planar surface is detailed in patent specification US 3,931,700. The flat, parallel top and bottom faces are identical, curved-sided hexagons, one rotated through 60° related to the other. Consequently the six side faces are curved surfaces in two directions: both parallel and perpendicular to the top and bottom faces.

While on the one hand a great effort is made to reach a conformity in the shape of the adjoining side faces and a perfect abutting contact this way, on the other hand manufacturing of the two-dimensional curved surfaces is extremely complicated and costly. Moreover the connection is inadequate not only for the infidelity of manufacture, but owing to the vertical edges with no overlapping surfaces.

Similar to the previous proposal is the paving block according to patent specification EP 0 164 264. The block has parallel top and bottom faces, two recessed and one extended side faces, while the fourth side face is perpendicular to the top and bottom faces.

From this shape follows that on this side there is no tight connection between the blocks' side faces. That means that the joint should be filled with mortar or other binding or filling material. Once the plane faces no forces can be transferred.

The aim of the present invention is to develop a set of elements for flagging surfaces or for walling comprising elements which are in tight connection to each other so that no binding material is needed. In spite of the standard tolerances both in manufacturing and placing the flagged or walled surfaces are plane and jointless. No element can be removed from the continuous surface.

The inventive conception is based on the idea that the elements for the flagging or walling set should be self-closing along the whole side surface. This condition is fulfilled if the side faces are curved or broken, since through joints cannot be formed this way. The side faces should support each other and should be shaped as a unit of extended and recessed sections.

According to the fixed aim the set of element for flagging surfaces, e.g. pavements, slopes, walls or for walling, - each element of said set has a flat top face and a flat bottom face parallel to each other, said top face and said bottom face are rectangular or polygonal with even-numbered sides, along the peripheries of said top face and said bottom face there are alternately bearing abutting side faces and covering abutting side faces conform to each other - is formed so, that virtual inclined planes are defined by the sides of said top face and the corresponding sides of said bottom face, and each of said abutting side faces comprise at least one extended face section and one adjoining recessed face section relating to said virtual inclined planes.

Another characteristic feature of the invention is that said extended face sections and said recessed face sections are curved.

In given case said extended face sections and said recessed face sections are stepped. In another possible case said extended face sections and said recessed face sections are ribbed.

The set of elements according to the invention has many advantageous features. The flagged surface made of the elements is free of through joints, there is no need of binding material. The shape of the element is simple, easy to manufacture. They can be made of a wide variety of building materials.

Each element is surrounded and supported by the adjoining elements, so they are fixed by each other. The load distribution is steady. In case of slightly uneven soil or bedding or not quite accurate sizes of the faces the flagged surface or the wall made of the elements according to the invention is still even, flat, well fixed and free of cracks.

The set of elements for flagging or walling will now be described in detail with reference to the accompanying drawings, where

- Fig. 1 is the top view of an element with a square top face,
Fig. 2 is the top view of an element with a rectangular top face,
Fig. 3 is another element with a rectangular top face,
Fig. 4 is the top view of an element with a hexagonal top face,
Fig. 5 is the top view of an element with an octangular top face,
Fig. 6 is the top view of a flagged surface comprising the elements according to the invention in a square net and the section in one of the main directions,
Fig. 7 is the sketch of a surface made of the elements shown in Fig. 2,
Fig. 8 is the sketch of another rectangular netted surface made of the elements shown in
Fig. 3,
Fig. 9 is the sketch of a hexagonal surface made of the elements shown in Fig. 4,
Fig. 10 is a sketch of a surface made of the combination of the elements shown in Fig. 1
and Fig. 5,
Fig. 11 is the section of an element with curved side face,
Fig. 12 is the section of an element with stepped side face,
Fig. 13 is an element with ribbed side face,
Fig. 14 is a flagged pavement's sectional view,
Fig. 15 is a footwall's sectional view.

The element in Fig. 1 has a flat square top face 1 and a flat rectangular bottom face 2' parallel to the flat square top face 1. One of the pairs of the side faces composed by two opposite side faces comprises curved bearing abutting side faces 5, while the other pair comprises curved covering abutting side faces 5'.

A rectangular element is in Fig. 2 with a flat rectangular top face 2 and a parallel flat rectangular bottom face 2'. The side faces of the element similar to the previous ones are curved bearing abutting side faces 5 and curved covering abutting side faces 5', a pair of each.

In Fig. 3 another element with a flat rectangular top face 2 and a parallel flat rectangular bottom face 2' can be seen. The side faces are similarly curved bearing abutting side faces 5 and curved covering abutting side faces 5'. The only difference is that the number of side faces is more than the number of sides of the top face or the bottom face.

A common feature of the elements of Fig. 1, 2 and 3 is, that the difference between the top faces' and the bottom faces' dimensions is always twice the height of the element. Two opposite sides of the bottom faces (1',2') are longer, while the other two opposite sides are shorter, than the corresponding sides of the top faces (1, 2), in the examples.

The element according to Fig. 3 has a flat hexagonal top face 3 and a flat hexagonal bottom face 3', while according to Fig. 5 the element has a flat octangular top face 4 and a flat octangular bottom face 4'. The side faces in both cases are curved bearing abutting side faces 5 and curved covering abutting side faces 5'. The number of the curved bearing abutting side faces 5 is always equal to the number of the curved covering abutting side faces 5'. Along the peripheries of the top faces 1, 2 and the bottom faces 1', 2' they are arranged alternately.

Fig. 6a is the top view of a flagged surface with square elements. That means that the top face is a flat square top face 1, while the bottom face owing to the dimensional differences is a flat rectangular bottom face 2'. In Fig. 6b is easy to observe that the curved bearing abutting side faces 5 of an element are arranged opposite to each other. In this section the curved covering abutting side faces 5' of the same element is not seen, but that of the adjoining element is in abutting side face 5 of the first element.

Fig. 7 is a sketch of the top view of a surface flagged by elements according to Fig. 2. It has to be noticed that two different sizes of elements are necessary for this surface: one with curved bearing abutting side faces 5 on the shorter side of the top face 2 and another with curved bearing abutting side faces 5 on the longer side and vica versa.

The surface according to Fig. 8 is made of elements according to Fig. 3. This is necessary because the pattern of the surface is cross bonded. Fig. 9 is a hexagonal, while Fig. 10 is an octangular pattern of flagged surfaces.

In Fig. 11 the flat square top face 1 and the flat rectangular bottom face 2' of the element according to Fig. 1 define a virtual inclined plane 8. The actual curved covering abutting side face 5' of the element in this example is compiled from an extended face section 9 and a recessed face section 9'. Expressions "extended" and "recessed" are meant related to the virtual inclined plane 8. It is important, that the extended face section 9 and the recessed face section 9' adjoin to each other.

On Fig. 12 and Fig. 13 connections between two neighbouring elements can be seen, successively a stepped bearing abutting side face 6 with a stepped covering abutting side face 6', and a ribbed bearing abutting side face 7 with a ribbed covering abutting side face 7'.

Fig. 14 is a section of a flagged surface on bedding made for pavement or other purpose.
Fig. 15 is a section of a footwall.

Employing the elements according to the invention different kinds of surfaces, slopes of channels, canals, open-air and covered area, and so on. The set of elements is also suitable for building walls, footwalls, revetment walls and the like.

CLAIMS

- 1./ A set of elements for flagging surfaces, e.g. pavements, slopes, walls or for walling, each element of said set has a flat top face and a flat bottom face parallel to each other, said top face and said bottom face are rectangular or polygonal with even-numbered sides, along the peripheries of said top face and said bottom face there are alternately bearing abutting side faces and covering abutting side faces conform to each other characterized by virtual inclined planes (8) defined by the sides of said top face (1,2,3,4) and the corresponding sides of said bottom face (1',2',3',4'), and each of said abutting side faces (5,6,7,5',6',7') comprising at least one extended face section (9) and one adjoining recessed face section (9') relating to said virtual inclined planes (8).
- 2./ A set of elements according to Claim 1 characterized by said extended face sections (9) and said recessed face sections (9') being curved.
- 3./ A set of elements according to Claim 1 characterized by said extended face sections (9) and said recessed face sections (9') being stepped.
- 4./ A set of elements according to Claim 1 characterized by said extended face sections (9) and said recessed face sections (9') being ribbed.

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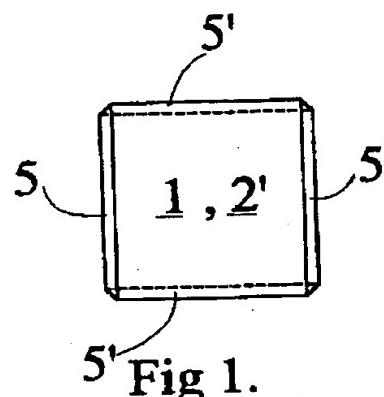


Fig 1.

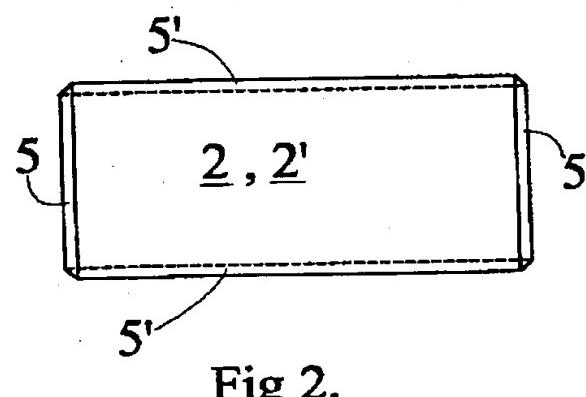


Fig 2.

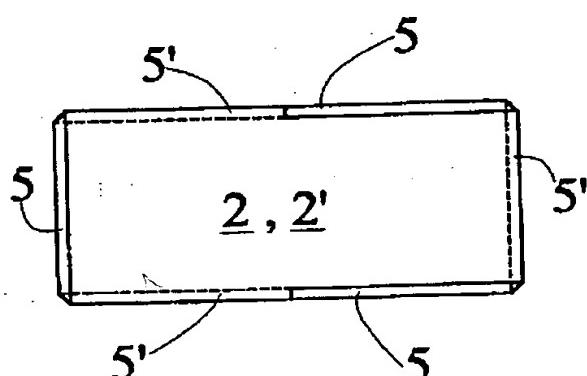


Fig 3.

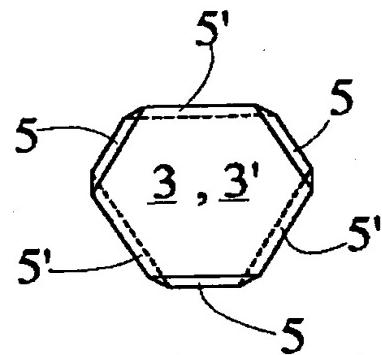


Fig 4.

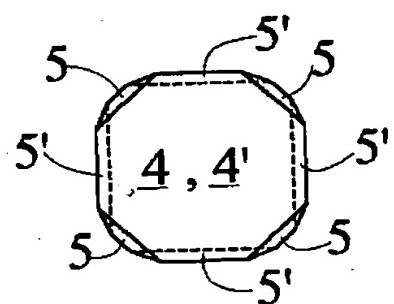


Fig 5.

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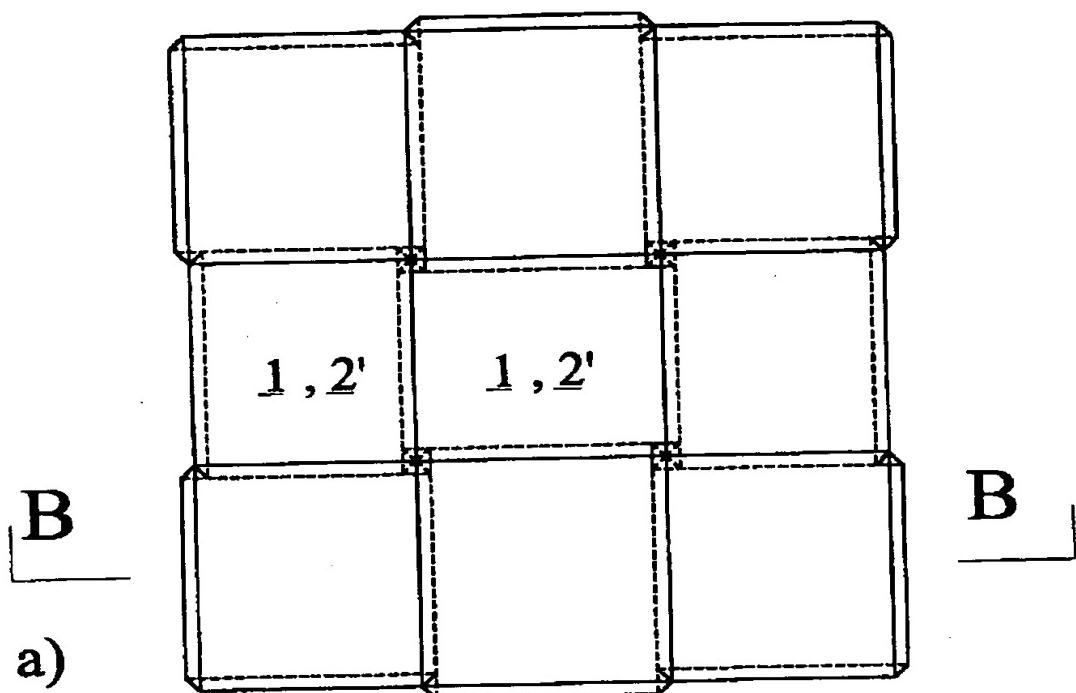


Fig 6.



Fig 7.

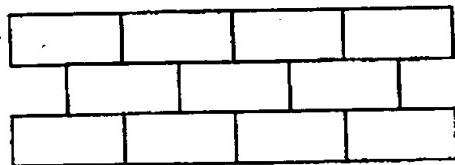


Fig 8.

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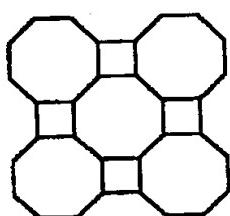


Fig 10.

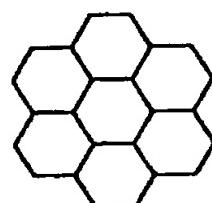


Fig 9.

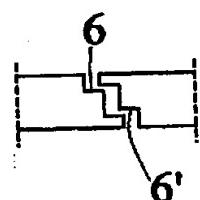


Fig 12.

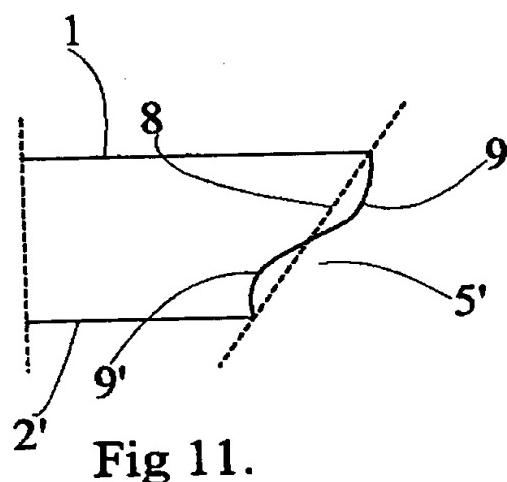


Fig 11.

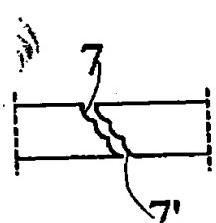


Fig 13.



Fig 14.

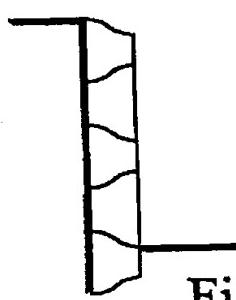


Fig 15.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/HU 96/00062

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 E01C5/00 E04F13/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 E01C E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 165 315 A (MOGICA) 3 August 1973 see the whole document ---	1-3
X	EP 0 187 294 A (GRUTZMACHER ARTUR) 16 July 1986 see the whole document -----	1,3

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/HU 96/00062

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2165315	03-08-73	BE-A- 792979 DE-A- 2261675 GB-A- 1403590 NL-A- 7217424 OA-A- 4423	16-04-73 05-07-73 28-08-75 22-06-73 29-02-80
EP-A-0187294	16-07-86	DE-A- 3445671	26-06-86

